

2.5 Cumulative Impacts

2.5.1 Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of this project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive types of agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

California Environmental Quality Act (CEQA) Guidelines, Section 15130, describes when a cumulative impact analysis is warranted and what elements are necessary for an adequate discussion of cumulative impacts. The definition of cumulative impacts, under CEQA, can be found in Section 15355 of the CEQA Guidelines. A definition of cumulative impacts, under the National Environmental Policy Act (NEPA), can be found in 40 CFR, Section 1508.7 of the Council on Environmental Quality (CEQ) Regulations.

Cumulative Analysis

This cumulative analysis determines whether the I-80 ICM project in combination with other approved or foreseeable projects would result in a significant cumulative impact, and, if so, whether the Build Alternative's contribution to the significant cumulative impact would be cumulatively considerable. Reasonably foreseeable future projects are described in Chapter 1, including the other system management strategies that are planned or have been implemented within the project corridor and connecting arterial roadways. The planned and funded projects located within or near the project corridor are anticipated to be constructed by the year 2015.

Planned developments:

- New Town Center (City of Hercules)
- Hilltown (City of Hercules)
- Gateway at Emeryville (City of Emeryville)

Planned vehicular transportation improvements:

- I-80/Powell Street eastbound off-ramp widening
- I-80/Gilman interchange reconfiguration
- I-80/Central Avenue interchange modification

- I-80/San Pablo Dam Road interchange modification
- I-80/Pinole Valley Road eastbound on-ramp improvements
- I-80 eastbound HOV lane, SR-4 to Carquinez Bridge
- Planned pavement maintenance project on I-80, from Alameda County post mile 2.5 to post mile 8.0
- Planned pavement resurfacing on I-80 in Oakland, Emeryville, Berkeley and Albany.

Planned other alternative mode of transportation improvements:

- Planned bicycle and pedestrian pathways to be located along the south side of I-80 in conjunction with the San Francisco-Oakland Bay Bridge East Span Replacement Project
- Planned bicycle and pedestrian I-80 overcrossing located to the south of Ashby Avenue
- Richmond Parkway transit center
- Central Richmond greenway and Class I bicycle trail
- The Refugio bridge bicycle, pedestrian, and vehicle connectivity project in Hercules
- Planned plant establishment project for shoreline habitat planting in Oakland and Emeryville

System management strategies:

- I-80 Traffic and Transit Information Traffic Operations Systems (TOS) project
- San Pablo Corridor Arterial and Transit Improvement project
- Richmond Parkway Transit Center project

2.5.1.1 No Adverse Effect

If the project would not result in a direct or indirect impact on a resource, then it will not contribute to a cumulative impact on that resource. The environmental analysis conducted for the project has determined that the project would not result in direct or indirect impacts on any resource, with the exception of paleontology and biological resources.

The environmental resource areas for which the project has been found to have no adverse effect include:¹

- Land Use
- Traffic
- Visual
- Cultural Resources
- Hydrology and Floodplains
- Water Quality and Storm Water runoff
- Geology/Soils/Seismicity/Topography
- Hazardous Waste/Materials
- Air Quality
- Noise
- Growth

¹ The project has been found to either have no effect or no adverse effect after implementation of the Department's Standard Provisions and/or compliance with required regulations on the resources identified. Therefore the project would not contribute to a cumulative impact on these resources.

- Farmlands and Timberlands
- Utilities and Emergency Services
- Wetlands and Other Waters

The potential for the project to contribute to cumulative effects on paleontological and biological resources are discussed in more detail below. Visual resources are also discussed below because the Visual Impact Assessment identified a cumulative issue of concern.

2.5.1.2 Visual Resources

The Build Alternative would not result in an adverse effect to visual resources.

2.5.1.3 Paleontology

The resource study area for paleontological resources is the I-80 corridor plus a 0.25-mile buffer on either side of the freeway, as described in the Paleontological Identification Report. The study area contains several geologic formations that have a high paleontological sensitivity, including the Pleistocene alluvial fan deposits, Holocene to Pleistocene alluvial fan deposits, and Pre-Quaternary deposits (of the Tertiary Period). Construction activities associated with the Build Alternative could impact unknown paleontological resources within these highly sensitive geologic units. Impacts to fossils may occur by destroying them or otherwise altering them in such a way that their scientific value is lost.

The implementation of **Mitigation Measure PAL-1** would avoid potential adverse effects on previously undiscovered paleontological resources that might be unearthed during the construction process. The preparation of a Paleontological Evaluation Report (PER) and subsequent paleontological mitigation program (PMP) would set forth specific direction to ensure that the excavation contractor and associated construction personnel are prepared to identify potential resources in the field and are clear about how such unanticipated discoveries are to be treated. Measures contained in the PMP would reduce potential paleontological impacts by allowing for the recovery of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise would be lost. The required provisions set forth by the Department for the preparation of the PER and PMP, and the implementation of **Mitigation Measure PAL-1**, would fully offset the potential adverse effects of the project to paleontological resources, resulting in no contribution to cumulative impacts.

2.5.1.4 Natural Communities

The resource study area for natural communities is equivalent to the Biological Study Area (BSA) defined in Section 2.4.1.1.² Biologists identified the following five vegetation communities within the BSA: valley and foothill grasslands, northern coastal salt marsh, north coast riparian scrub, coastal and valley freshwater marsh, and landscaped. The majority of the study area is developed with paved roadways and residential, industrial, and commercial land uses. Two communities, valley and foothill grasslands and landscaped, would be directly impacted by construction activities associated with the Build Alternative. Indirect impacts to the northern coastal salt marsh could also occur during construction (see Section 2.4.1.2). Pursuant to CEQA and NEPA, the Department has proposed a number of reasonable and

² The BSA for the project corridor encompasses all areas of ground disturbance that would occur during the construction of the Build Alternative. The BSA extends 100 feet from the edge of the paved freeway surface and/or the edge of any component of the Build Alternative.

prudent measures to minimize and avoid impacts to sensitive natural communities that would fully offset the adverse effects of the project, resulting in no contribution to cumulative impacts. These measures are considered part of the project design, as described in Section 2.4.1.3.

2.5.1.5 Plant Species

The resource study area for special-status plant species is equivalent to the BSA defined in Section 2.4.1.1. No special-status plant species are expected to occur in the BSA. However, two species in the region— bent-flowered fiddleneck (*Amsinckia grandiflora*) and robust monardella (*Monardella villosa* ssp. *Globosa*)—have habitat requirements that are present in the BSA. Implementation of the Build Alternative would permanently remove approximately 3.87 acres of suitable special-status plant species habitat. Potential indirect effects include disturbances from the generation of dust and degradation of water quality during construction activities. Pursuant to CEQA and NEPA, the Department has proposed a number of reasonable and prudent measures to minimize and avoid impacts to special-status plant species, which fully offset the adverse effects of the project, resulting in no contribution to cumulative impacts. These measures are considered part of the project design, as described in Section 2.4.3.4.

2.5.1.6 Animal Species

The resource study area for special-status animal species is equivalent to the BSA defined in Section 2.4.1.1. Eighteen special-status wildlife species have the potential to occur in the BSA. Five of those species are listed as endangered or threatened under CESA or FESA and are included in the discussion below (see Section 2.5.1.7). The remaining 13 special-status species include the monarch butterfly, western pond turtle, nesting birds and roosting bats. Implementation of the Build Alternative would permanently remove approximately 3.87 acres of suitable burrowing owl nesting and foraging habitat within the BSA. Potential indirect effects include disturbances from the generation of noise and dust, and the degradation of water quality during construction activities. Pursuant to CEQA and NEPA, the Department has proposed a number of reasonable and prudent measures to minimize and avoid impacts to special-status animal species, which fully offset the adverse effects of the project, resulting in no contribution to cumulative impacts. These measures are considered part of the project design, as described in Section 2.4.4.4.

2.5.1.7 Threatened and Endangered Species

The resource study area for threatened and endangered species is equivalent to the Biological Study Area (BSA) defined in Section 2.4.1.1. The following five species were identified as potentially occurring within the BSA: California red-legged frog (*Rana draytonii*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), California clapper rail (*Rallus longirostris obsoletus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), and the California black rail (*Laterallus jamaicensis coturniculus*). The Build Alternative would result in the direct displacement of California red-legged frog and Alameda whipsnake habitat. Potential indirect effects include disturbances from the generation of noise and dust, and the degradation of water quality during construction activities. Pursuant to CEQA and NEPA, the Department has proposed a number of reasonable and prudent measures to minimize and avoid impacts to threatened and endangered animal species, which fully offset the adverse effects of the project, resulting in no contribution to cumulative impacts. These measures are considered part of the project design, as described in Section 2.4.5.4.

2.5.2 Avoidance, Minimization and/or Mitigation Measures

The avoidance, minimization and/or mitigation measures included in Sections 2.2 through 2.4 are expected to fully offset potential adverse effects of the Build Alternative resulting in no contribution to cumulative impacts.

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2.6 Climate Change (CEQA)

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gases (GHGs), particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations and World Meteorological Organization in 1988, has led to the increased efforts devoted to greenhouse gas (GHG) emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs related to human activity that include carbon dioxide (CO₂), methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

There are typically two terms used when discussing the impacts of climate change. "Greenhouse Gas (GHG) Mitigation" is a term for reducing GHG emissions in order to reduce or "mitigate" the impacts of climate change. "Adaptation," refers to the effort of planning for and adapting to impacts due to climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels)³.

Transportation sources (passenger cars, light duty trucks, other trucks, buses and motorcycles) in the state of California make up the largest source (second to electricity generation) of greenhouse gas emitting sources. Conversely, the main source of GHG emissions in the United States (U.S.) is electricity generation followed by transportation. The dominant GHG emitted is CO₂, mostly from fossil fuel combustion.

There are four primary strategies for reducing GHG emissions from transportation sources: 1) improve system and operation efficiencies, 2) reduce growth of vehicle miles traveled (VMT) 3) transition to lower GHG fuels and 4) improve vehicle technologies. To be most effective all four should be pursued collectively. The following regulatory setting section outlines state and federal efforts to comprehensively reduce GHG emissions from transportation sources.

2.6.1 Regulatory Setting

State

With the passage of several pieces of legislation including State Senate and Assembly Bills and Executive Orders, California launched an innovative and pro-active approach to dealing with greenhouse gas emissions and climate change at the state level.

Assembly Bill 1493 (AB 1493), Pavley, Vehicular Emissions: Greenhouse Gases (AB 1493), 2002: requires the California Air Resources Board (CARB) to develop and implement regulations to reduce automobile and light truck greenhouse gas emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year. In June 2009, the U.S.

³ http://climatechange.transportation.org/ghg_mitigation/

Environmental Protection Agency (U.S. EPA) Administrator granted a Clean Air Act waiver of preemption to California. This waiver allowed California to implement its own GHG emission standards for motor vehicles beginning with model year 2009. California agencies will be working with Federal agencies to conduct joint rulemaking to reduce GHG emissions for passenger cars model years 2017-2025.

Executive Order S-3-05: (signed on June 1, 2005, by Governor Arnold Schwarzenegger). The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the 2020 and 3) 80 percent below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.

Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006: AB 32 sets the same overall GHG emissions reduction goals as outlined in Executive Order S-3-05, while further mandating that CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the State's Climate Action Team.

Executive Order S-01-07: Governor Schwarzenegger set forth the low carbon fuel standard for California. Under this Executive Order, the carbon intensity of California's transportation fuels is to be reduced by at least ten percent by 2020.

Senate Bill 97 (Chapter 185, 2007): required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the State CEQA Guidelines for addressing greenhouse gas emissions. The Amendments became effective on March 18, 2010.

Federal

Although climate change and GHG reduction is a concern at the federal level; currently there are no regulations or legislation that have been enacted specifically addressing GHG emissions reductions and climate change at the project level. Neither the United States Environmental Protection Agency (U.S. EPA) nor the Federal Highway Administration (FHWA) has promulgated explicit guidance or methodology to conduct project-level greenhouse gas analysis. As stated on FHWA's climate change website (<http://www.fhwa.dot.gov/hep/climate/index.htm>), climate change considerations should be integrated throughout the transportation decision-making process—from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will facilitate decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project level decision-making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

The four strategies set forth by FHWA to lessen climate change impacts do correlate with efforts that the State has undertaken and is undertaking to deal with transportation and climate change; the strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and reduction in the growth of vehicle hours travelled.

Climate change and its associated effects are also being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the “National Clean Car Program” and Executive Order 13514 – *Federal Leadership in Environmental, Energy and Economic Performance*.

Executive Order 13514 is focused on reducing greenhouse gases internally in federal agency missions, programs and operations, but also direct federal agencies to participate in the interagency Climate Change Adaptation Task Force, which is engaged in developing a U.S. strategy for adaptation to climate change.

On April 2, 2007, in *Massachusetts vs. EPA*, 549 U.S. 497 (2007), the Supreme Court found that greenhouse gases are air pollutants covered by the Clean Air Act and that the U.S. EPA does have the authority to regulate GHG. Court held that the U.S. EPA Administrator must determine whether or not emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, the U.S. EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The Administrator found that the current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆)—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator found that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the U.S. EPA’s *Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles*, which was published on September 15, 2009.⁴ On May 7, 2010 the final *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards* was published in the Federal Register.

U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations. These steps were outlined by President Obama in a memorandum on May 21, 2010.⁶

The final combined U.S. EPA and NHTSA standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon (MPG) if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements.

⁴ <http://www.epa.gov/climatechange/endangerment.html>

⁶ <http://epa.gov/otaq/climate/regulations.htm>

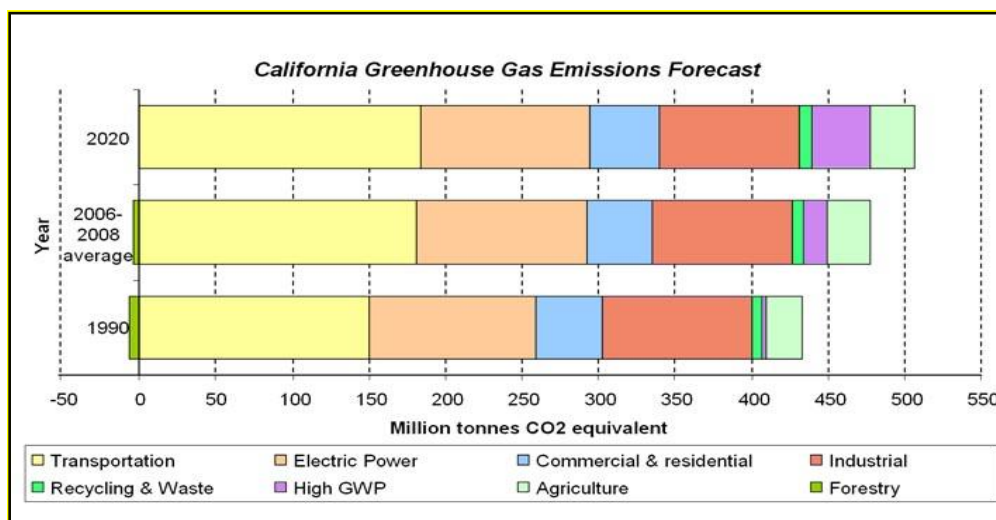
Together, these standards will cut GHG emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

On January 24, 2011, the U.S. EPA along with the U.S. Department of Transportation and the State of California announced a single timeframe for proposing fuel economy and greenhouse gas standards for model years 2017-2025 cars and light-trucks. Proposing the new standards in the same timeframe (September 1, 2011) signals continued collaboration that could lead to an extension of the current National Clean Car Program.

Project Analysis

An individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may participate in a potential impact through its incremental contribution combined with the contributions of all other sources of GHG. In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable." See California Environmental Quality Act (CEQA) Guidelines sections 15064(h)(1) and 15130. To make this determination the incremental impacts of the proposed project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects in order to make this determination is a difficult if not impossible task.

The AB 23 Scoping Plan contains the main strategies California will use to reduce GHG. As part of its supporting documentation for the Draft Scoping Plan, ARB released the GHG inventory for California (Forecast last updated: October 28, 2010). The forecast is an estimate of the emissions expected to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the GHG inventory for 2006, 2007, and 2008.



Taken from: <http://www.arb.ca.gov/cc/inventory/data/forecast.ht>

Figure 2-4: California Greenhouse Gas Forecast

The Department and its parent agency, the Business, Transportation, and Housing Agency, have taken an active role in addressing GHG emission reduction and climate change. Recognizing that 98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human made GHG emissions are from transportation, the Department has created and is implementing the Climate Action Program that was published in December 2006 (See Climate Action Program at the Department, December 2006).⁷

2.6.2 Project Analysis

Transportation system efficiency is one of the key strategies in the Department's Climate Action Program to reduce GHG emissions. As shown in **Figure 2-6**, below, the highest levels of carbon dioxide from automobiles occur at stop-and-go speeds (0-25 miles per hour). To the extent that a project relieves congestion in highly travelled corridors, GHG emissions, particularly CO₂, may be reduced. In the project corridor, where constraints prevent widening, congestion relief is achieved through operational improvements that reduce travel times.

As described in Section 2.2.3, under year 2015 recurring (non-incident) conditions, the Build Alternative would reduce vehicle hours of delay by 22 percent in the morning peak period and by 10 percent in the evening peak period on the I-80 freeway. Network-wide, the build Alternative is expected to result in an 8 percent reduction in vehicle hours of delay during both the morning and evening peak periods.

In terms of average vehicle speeds on the I-80 freeway, the Build Alternative would result in a 5 percent increase (2.0 miles per hour) during the morning peak period and a 6 percent increase (1.6 miles per hour) in the evening peak period. Although isolated delays are expected when ramps are metered, motorists would experience an overall travel savings since delays on the freeway would be reduced.

In addition, the Build Alternative would also reduce the impact of non-recurring or incident-related traffic congestion. Under the incident scenario, the Build Alternative would reduce vehicle hours of delay on westbound I-80 by 12 percent, as compared to the No-Build scenario. Similarly, average travel time from the Carquinez Bridge to the San Francisco-Oakland Bay Bridge Toll Plaza during an incident would decrease by 13 percent along westbound I-80.

⁷ Caltrans Climate Action Program is located at the following web address:
http://www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf

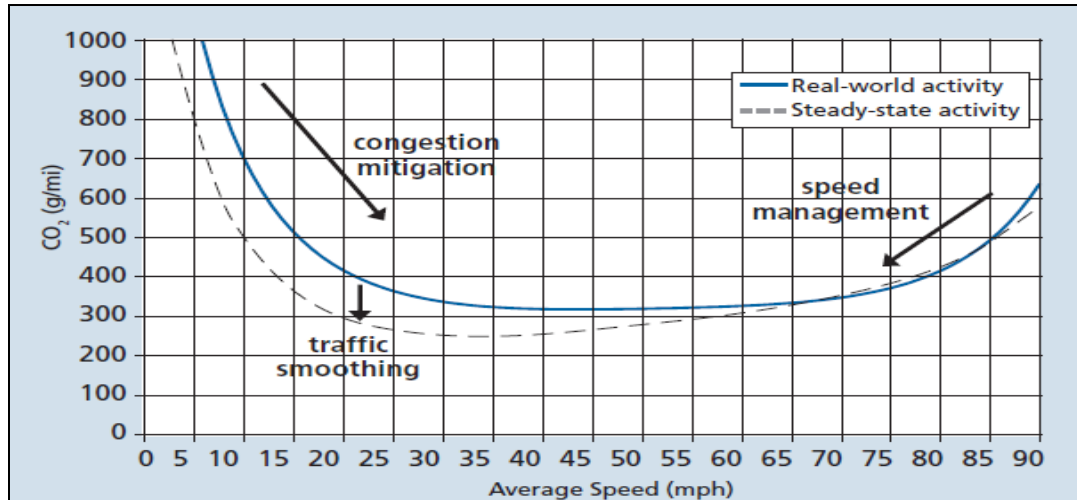


Figure 2-5: Possible Effect of Traffic Operation Strategies in Reducing On-road CO₂ Emission⁸

Transit Alternatives

Expansion of bus and rail transit services along the I-80 corridor would reduce the number of personal vehicles on the freeway and connecting arterials, thereby reducing the amount of GHG emissions. The U.S. EPA estimates that an individual who leaves their car at home for just two days a week will reduce GHG emissions by an average 1,600 pounds per year.⁹ There are a number of transit services expansion projects in the areas surrounding I-80 corridor that are being studied or have been approved. These transit services expansion projects are being pursued by other agencies and organizations, with input from the Department, but are not part of the proposed I-80 ICM project.

Operational Emissions

The I-80 ICM project is expected to improve traffic flow by enhancing operations and improving travel times in the I-80 corridor. This improvement in traffic flow, without an increase in vehicle miles traveled, would result in long-term GHG reduction benefits. The reduction in GHG emissions would support the strategies of the Department's Climate Action Program.

Construction Emissions

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations. Construction GHG emissions include emissions produced as a result of material processing, emissions produced by onsite construction equipment, and emissions arising from traffic delays due to construction. These emissions would be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

⁸ Traffic Congestion and Greenhouse Gases: Matthew Barth and Kanok Boriboonsomsin (TR News 268 May-June 2010) <<http://onlinepubs.trb.org/onlinepubs/trnews/trnews268.pdf>>

⁹ USEPA Climate Change: What You Can Do on the Road (web site).

In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the GHG emissions produced during construction can be mitigated to some degree by longer intervals between maintenance and rehabilitation events. Although compliance with the Department's Standard Specifications and implementation of BAAQMD control measures would be expected to minimize construction-related emissions, the I-80 ICM project would result in a temporary increase in GHG emissions during construction. Although construction emissions would be unavoidable, the project would result in long-term GHG reduction benefits, as described above.

CEQA Conclusion

The proposed project is expected to improve traffic flow and decrease overall congestion in the project area. The project is not expected to increase operational greenhouse gas emissions. The Department is not able to make a determination regarding the significance of the project's direct impact and its contribution on the cumulative scale to climate change. The Department is committed to implementing measures to help reduce greenhouse gas emissions. These measures are outlined in the following discussions.

Greenhouse Gas Reduction Strategies

AB 32 Compliance

The Department continues to be actively involved on the Governor's Climate Action Team as ARB works to implement the Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies the Department is using to help meet the targets in AB 32 come from the California Strategic Growth Plan, which is updated each year. Former Governor Arnold Schwarzenegger's Strategic Growth Plan calls for a \$222 billion infrastructure improvement program to fortify the state's transportation system, education, housing, and waterways, including \$100.7 billion in transportation funding during the next decade. The Strategic Growth Plan targets a significant decrease in traffic congestion below today's level and a corresponding reduction in GHG emissions. The Strategic Growth Plan proposes to do this while accommodating growth in population and the economy. A suite of investment options has been created that combined together are expected to reduce congestion. The Strategic Growth Plan relies on a complete systems approach to attain CO₂ reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, intelligent transportation systems, traveler information/traffic control, incident management, operational improvements, and system completion and expansion.



Figure 2-6: The Mobility Pyramid

The Department is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high density housing along transit corridors. The Department is working closely with local jurisdictions on planning activities; however, the Department does not have local land use planning authority. The Department is also supporting efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light and heavy-duty trucks; the Department is doing this by supporting on-going research efforts at universities, by supporting legislative efforts to increase fuel economy, and by its participation on the Climate Action Team. It is important to note, however, that the control of the fuel economy standards is held by U.S. EPA and ARB. Lastly, the use of alternative fuels is also being considered; the Department is participating in funding for alternative fuel research at the UC Davis.

Table 2.6-1 summarizes the Department and statewide efforts that the Department is implementing in order to reduce GHG emissions. More detailed information about each strategy is included in the Climate Action Program at the Department.

Adaptation Strategies

“Adaptation strategies” refer to how the Department and others can plan for the effects of climate change on the state’s transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damaging roadbeds by longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects would vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the Federal level, the Climate Change Adaptation Task Force, co-chaired by the White House Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA), released its interagency report October 14, 2010 outlining recommendations to President Obama for how Federal Agency policies and programs can better prepare the United States (U.S.) to respond to the impacts of climate change. The Progress Report of the Interagency Climate Change Adaptation Task Force recommends that the Federal Government implement actions to expand and strengthen the Nation’s capacity to better understand, prepare for, and respond to climate change.

Climate change adaption must also involve the natural environment as well. Efforts are underway on a statewide-level to develop strategies to cope with impacts to habitat and biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

On November 14, 2008, Governor Schwarzenegger signed Executive Order S-13-08 which directed a number of state agencies to address California’s vulnerability to sea level rise caused by climate change. This Executive Order set in motion several agencies and actions to address the concern of sea level rise.

Table 2.6-1: Climate Change/CO₂ Reduction Strategies

Strategy	Program	Partnership		Method/Process	Estimated CO ₂ Savings (MMT)	
		Lead	Agency		2010	2020
Smart Land Use	Intergovernmental Review (IGR)	The Department	Local Governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	The Department	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	The Department	Regional plans and application process	0.975	7.8
Operational Improvements & Intelligent Trans. System (ITS) Deployment	Strategic Growth Plan	The Department	Regions	State ITS; Congestion Management Plan	.007	2.17
Mainstream Energy & GHG into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, CalEPA, CARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 B100	0.0045	0.0065 0.45 .0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 .36	4.2 3.6
Goods Movement	Office of Goods Movement	Cal EPA, CARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					2.66	18.67

The California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state and federal public and private entities to develop *The California Climate Adaptation Strategy* (Dec 2009)¹⁰, which summarizes the best known science on climate change impacts to California, assesses California's vulnerability to the identified impacts and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to Executive Order S-13-08 that specifically asked the Resource Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the Environmental Protection; Business, Transportation and Housing; Health and Human Services; and the Department of Agriculture. The document broke down into strategies for different sectors that include: Public Health; Biodiversity and Habitat; Ocean and Coastal Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure. As data continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

Resources Agency was also directed to request the National Academy of Science to prepare a *Sea Level Rise Assessment Report* by December 2010¹¹ to advise how California should plan for future sea level rise. The report is to include:

- relative sea level rise projections for California, Oregon and Washington taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge and land subsidence rates;
- the range of uncertainty in selected sea level rise projections;
- a synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems;
- a discussion of future research needs regarding sea level rise for California.

Prior to the release of the final *Sea Level Rise Assessment Report*, all state agencies that are planning to construct projects in areas vulnerable to future sea level rise were directed to consider a range of sea level rise scenarios for the years 2050 and 2100 in order to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should also be used in conjunction with information regarding local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge and storm wave data.

Until the final report from the National Academy of Sciences is released, interim guidance has been released by the Coastal Ocean Climate Action Team (CO-CAT) as well as the Department as a method to initiate action and discussion of potential risks to the state's infrastructure due to projected sea level rise.

All projects that have filed a Notice of Preparation, and/or are programmed for construction funding from 2008 through 2013, or are routine maintenance projects as of the date of Executive Order S-13-08 may, but are not required to, consider these planning guidelines.

¹⁰ <http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>

¹¹ The Sea Level Rise Assessment report is currently due to be completed in 2012 and will include information for Oregon and Washington State as well as California.

Furthermore Executive Order S-13-08 directed the Business, Transportation, and Housing Agency to prepare a report to assess vulnerability of transportation systems to sea level affecting safety, maintenance and operational improvements of the system and economy of the state. The Department continues to work on assessing the transportation system vulnerability to climate change, including the effect of sea level rise.

Currently, the Department is working to assess which transportation facilities are at greatest risk from climate change effects. However, without statewide planning scenarios for relative sea level rise and other climate change impacts, the Department has not been able to determine what change, if any, may be made to its design standards for its transportation facilities. Once statewide planning scenarios become available, the Department would be able review its current design standards to determine what changes, if any, may be warranted in order to protect the transportation system from sea level rise.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. The Department is an active participant in the efforts being conducted in response to Executive Order S-13-08 and is mobilizing to be able to respond to the National Academy of Science report on Sea Level Rise Assessment which is due to be released in 2012.

As shown on page 169 of the MTC 2011 TIP, all proposed project funding was programmed prior to 2013. The proposed project was not included in the 2007 TIP. As the proposed project was programmed for construction between the years 2008 and 2013, it is not necessary for the proposed project to consider a range of sea rise scenarios.

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